

the supply of water for domestic, agricultural, and commercial purposes was reduced to a dangerous minimum. The situation was especially grave in Pennsylvania, New York, and Maryland, and at the close of the month there was no prospect of early relief.

There were minor floods in the Grand River of Missouri and in Chisholm Creek, a tributary of the Arkansas River, in the vicinity of Wichita, Kans. The flood in the Grand River was caused by heavy rains on November 11 and 12, over south-central Iowa and northern Missouri, and the river at Chillicothe, Mo., rose from 5.9 feet on November 12 to 26.2 feet on November 18, flood stage being at 18 feet. Warnings for a stage of 21 feet were issued on November 13, failure to forecast the higher stage reached having been due to absence of precipitation data from the Iowa portion of the drainage area. The rise came from both branches of the river, but there was no damage of consequence, as the great flood of July, 1922, left nothing more subject to damage from overflow.

The flood in Chisholm Creek, Kans., was due to the same general rain storm, Wichita, Kans., reporting 4.20 inches in 24 hours. The flood waters came entirely from Chisholm Creek, and nearly 3 square miles of North Wichita were covered with water. While the inconvenience caused was great, the damage was slight. As there are no reporting stations on Chisholm Creek, it was impossible to issue warnings of the flood.

The new canal in the Mississippi River at Le Claire, Iowa, was opened for business about the end of the month. The pool formed by the construction of the necessary dam has eliminated the Rock Island Rapids, which in the past have proved a great hindrance to navigation. The canal begins at the upper end of the Rock Island Rapids, just below Le Claire and extends downstream, roughly paralleling the Iowa shore, and Smiths Island was used as a portion of the eastern bank. The total length of the improvement is about  $3\frac{1}{2}$  miles.

*Flood stages during November, 1922.*

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
MISSISSIPPI DRAINAGE.					
Grand: Chillicothe, Mo.....	<i>Fect.</i> 18	14	19	<i>Fect.</i> 26.2	18

#### MEAN LAKE LEVELS DURING NOVEMBER, 1922.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., Dec. 5, 1922.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes. <sup>1</sup>			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during November, 1922: Above mean sea level at New York. ....	<i>Fect.</i> 602.35	<i>Fect.</i> 579.54	<i>Fect.</i> 571.41	<i>Fect.</i> 245.15
Above or below—				
Mean stage of October, 1922. ....	-0.15	-0.43	-0.45	-0.46
Mean stage of November, 1921. ....	+0.15	-0.10	-0.39	+0.30
Average stage for November, last 10 years. ....	-0.25	-0.81	-0.57	-0.51
Highest recorded November stage. ....	-1.16	-3.38	-2.26	-2.67
Lowest recorded November stage. ....	+0.35	+0.36	+0.71	+1.74
Average relation of the November level to—				
October level. ....		-0.20	-0.20	-0.20
December level. ....		+0.20	+0.20	+0.20

<sup>1</sup> Lake St. Clair's level: In November, 574.21 feet.

#### INFLUENCE OF WEATHER ON CROPS AND FARMING OPERATIONS—NOVEMBER, 1922.

By J. WARREN SMITH, Meteorologist.

November, 1922, was mild for the season in all sections east of the Rocky Mountains, especially from the central Mississippi Valley and central Plains States northward, where the temperature averaged from 4° to 7° above the normal. The first half of the month was cold, however, west of the Rocky Mountains, and the temperature for the month as a whole averaged below normal in that section. The drought conditions that had prevailed between the Mississippi Valley and the Rocky Mountains were relieved or broken early in the month by copious rains, and rainfall about the middle of the month was beneficial in the central Mississippi and the Ohio Valley States. The severe droughty conditions continued, however, throughout the month in most of the middle Atlantic coast section, particularly in much of Pennsylvania, New Jersey, and New York, where streams and wells were reported to be very low and stock water scarce.

Winter grains were greatly benefited by rainfall in the central trans-Mississippi States during the first week in the month, particularly in Kansas, where the best rains in three months occurred. The soil was put in good condition also in Oklahoma, and the seeding of wheat was resumed in that State. Good rains fell in much of the Ohio Valley area during the week ending November 21, which was helpful to winter wheat, particularly in Kentucky. Wheat showed substantial improvement in that area during the latter half of the month and at its close was in mostly good condition to go into the winter. Snowfall the latter part of the month in the far northwestern States was beneficial, although moisture continued insufficient in many sections of that area. Winter cereals needed moisture throughout most of the South.

The mild, dry weather during the first half of the month in the South Atlantic States was favorable for maturing late corn in that section, and conditions were generally favorable for husking and cribbing from the Ohio Valley eastward. Fields were too wet for gathering corn in parts of Iowa and husking made slow progress during much of the month, while there was some damage to corn that had been blown down. The weather was mild and pleasant in much of the interior of the country during the latter part of the month and gathering corn, where not completed, made good progress in most sections.

Conditions were favorable for maturing and harvesting late cotton in the northeastern cotton growing districts but unusually early killing frosts did some damage to this crop in Arizona during the first week of the month. Some top crop matured in Texas. At the close of the month some cotton was still in the fields in the northeastern portion of the belt, but harvest was mostly completed elsewhere.

Truck crops were benefited by rains early in the month in parts of Texas, but moisture continued deficient from the lower Mississippi Valley northeastward to the Middle Atlantic States.

There was improvement in soil conditions in southern Florida, where it had been too wet. It was too warm in Louisiana for the best development of sugar cane, although the lower temperatures the latter part of the month were favorable.

There was sufficient moisture the first half of the month to improve ranges in the West, except in New Mexico, western Texas, and northeastern Arizona, but the continued dry weather in the eastern States was

unfavorable and stock-water shortage continued in many sections. Stock suffered considerably from the cold and snow in some Rocky Mountain sections and Western South Dakota. The unusually mild weather the latter half of the month allowed stock to feed on ranges and harvested fields in the northern Plains States, but much feeding was necessary in northwestern Montana. Ranges improved in central and western Texas, but there was no material change in New Mexico, where shipment to outside ranges continued.

Some damage resulted to apples by freezing in eastern Washington, and some apples were frozen on the trees in Utah during the first week of the month. Strawberries showed some improvement in Florida, but were in generally unsatisfactory condition. It was too warm during most of the month for the best development of citrus in that State, but the cooler weather the latter part was beneficial. Citrus fruits were reported as sizing and coloring nicely in California, and some lemon picking was done the latter part of the month.

CLIMATOLOGICAL TABLES.<sup>1</sup>

## CONDENSED CLIMATOLOGICAL SUMMARY.

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

*Condensed climatological summary of temperature and precipitation, by sections, November, 1922.*

Section.	Temperature.								Precipitation.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
	° F.	° F.		° F.				° F.		In.	In.		In.	In.
Alabama	57.3	+3.0	Selma	92	1	Valley Head	18	28	1.88	-1.27	Centerville	4.73	Alaga	0.20
Alaska														
Arizona	47.5	-3.9	Parker	90	8	Fort Valley	-2	4	1.32	+0.32	Ashdale Ranger Sta.	4.00	2 stations	0.20
Arkansas	52.9	+1.4	El Dorado	88	4	Dutton	20	21	3.89	+0.32	Lincoln	8.82	Texarkana	0.86
California	49.4	-3.4	Indio	91	20	Yreka	8	29	3.33	+0.73	Placerville	9.55	Bagdad	0.00
Colorado	32.6	-2.3	Lamar	78	10	Dillon	-23	13	1.68	+0.81	Savage Basin	4.95	Yuma	T.
Florida	67.8	+2.6	Orlando	92	6	2 stations	26	29	1.60	-1.29	Fort Lauderdale	3.52	2 stations	0.00
Georgia	57.0	+2.3	4 stations	87	23	Clayton	15	29	0.92	-1.73	Canton	12.32	Millen	0.00
Hawaii	71.5	-0.1	Kauealeu No. 2	91	24	Volcano Observatory	48	22	7.95	-0.11	Eke, Maui	32.00	Olowalu, Maui	0.03
Idaho	32.8	-2.7	Mountain Home	68	1	Obsidian	8	30	0.82	-1.35	Prichard	2.40	Glenns Ferry	0.15
Illinois	45.0	+3.1	Mount Carmel	82	1	Clinton	11	25	2.78	+0.38	Quincy	5.88	Palestine	1.60
Indiana	45.0	+2.9	Vevay	86	2	Shoals	12	25	2.25	-0.81	Noblesville	3.57	2 stations	1.19
Iowa	42.2	+7.2	Clarinda	74	4	Decorah	11	25	3.54	+2.03	Iowa City	5.28	Perry	1.96
Kansas	45.6	+1.5	2 stations	80	4	St. Francis	7	14	2.77	+1.57	Herington	7.08	2 stations	T.
Kentucky	48.3	+2.2	Hopkinsville	87	1	Junction City	10	24	1.93	-1.42	Bowling Green	4.55	Shelbyville	0.73
Louisiana	62.9	+4.0	Ten Mile	91	5	3 stations	29	22	4.28	+0.97	Lakeside	17.96	Burrwood	0.58
Maryland-Delaware	46.3	+1.4	11 stations	75	12	Oakland, Md.	14	10	0.66	-1.98	Oakland, Md.	1.27	Westernport, Md.	0.40
Michigan	39.4	+3.6	Charlotte	70	1	Humboldt	8	25	2.34	-0.10	Calumet	5.78	Durand	0.54
Minnesota	35.9	+6.3	Pine River Dam	76	3	Itasca State Park	2	28	3.32	+2.41	Alexandria	5.41	Gonvick	1.61
Mississippi	58.3	+3.5	2 stations	90	2	2 stations	25	29	3.78	+0.35	Natchez	7.55	Fulton	1.58
Missouri	47.8	+2.9	Bolivar	87	3	Goodland	15	26	3.82	+1.45	Dean	6.75	Fulton	1.11
Montana	30.8	+1.5	Crow Agency	72	5	Chinook	-18	30	0.84	-0.09	Big Timber	3.26	Chinook	0.03
Nebraska	39.5	+3.0	Weeping Water	78	3	North Loup	3	14	2.55	+1.79	Tekamah	5.02	Alma	0.54
Nevada	36.8	-3.7	Logandale	80	14	Butte Mountain	8	23	0.67	+0.15	Lamoille	2.30	Mina	0.00
New England	38.0	+0.9	Turners Falls, Mass.	74	1	2 stations	3	27	1.45	-1.98	Somerset, Vt.	2.87	Block Island, R. I.	0.54
New Jersey	44.3	+1.3	Bridgeton	73	12	Boonton	13	26	0.91	-2.29	Highwood	1.56	Phillipsburg	0.40
New Mexico	40.2	-2.3	3 stations	82	28	Hermosa	-2	17	1.08	+0.42	Diener	5.81	2 stations	0.11
New York	39.6	+2.1	3 stations	70	2	Indian Lake	-1	27	1.42	-1.37	Gabriels	3.57	Avon	0.24
North Carolina	50.0	+0.8	Sloan	88	6	Banners Elk	4	29	0.63	-1.84	Bryson City	1.82	Rougmont	T.
North Dakota	31.8	+5.2	Granville	65	16	Howard	8	30	2.33	+1.75	Pembina	5.33	Lamoline	0.40
Ohio	43.9	+2.8	2 stations	79	2	Millfordton	10	29	1.56	-1.13	Williamsfield	2.75	Clarington	0.76
Oklahoma	51.4	+0.9	Tablequah	89	2	Hooker	12	14	3.58	+1.14	Watts	9.69	Beaver	0.31
Oregon	37.9	-3.3	Marshfield	69	21	Lapine	-4	3	2.09	-2.55	Willow Creek	6.51	Blitzen	0.13
Pennsylvania	42.9	+2.2	2 stations	73	2	Bradys Bend	12	29	1.21	-1.46	Saegerstown	4.52	Neshaminy Falls	0.23
Porto Rico	75.7	-1.0	San German	97	20	Aibonito	52	25	3.64	-3.81	Peuelas	7.39	Portala	0.79
South Carolina	54.8	+0.9	2 stations	88	11	Walhalla	17	29	0.61	-1.67	Cheraw	1.29	Paris Island	0.00
South Dakota	35.1	+2.8	Norris	69	16	Gannvalley	-2	19	3.00	+2.46	Deadwood	5.50	Orman	1.00
Tennessee	50.0	+1.6	2 stations	82	2	Rugby	11	29	2.39	-0.96	Perryville	5.56	Copperhill	0.57
Texas	58.4	+1.4	Mission	95	4	Romero	11	13	2.57	+0.18	Liberty	7.14	Riomedina	0.07
Utah	35.7	-2.5	Lehi	75	1	Loa	-5	8	1.52	+0.47	Silver Lake	5.45	3 stations	T.
Virginia	47.5	+1.3	Onley	87	17	Burkes Garden	5	29	0.57	-1.80	West Point	1.62	Mayhurst	0.07
Washington	37.3	-3.7	Wind River	67	18	2 stations	3	20	1.51	-3.36	Quinalt	6.34	Moxee	0.22
West Virginia	43.8	+1.1	4 stations	80	1	Cheat Bridge	2	29	1.15	-1.40	Pickens	2.49	Moorefield	0.17
Wisconsin	39.1	+5.6	Hillsboro	70	10	Solon Springs	-4	25	3.11	+1.32	Weyerhaeuser	4.96	Brule Island	1.76
Wyoming	28.4	-3.2	Green River	69	8	South Pass City	-15	3	1.24	+0.53	Knowles	3.84	Elk Mountain	T.

<sup>1</sup>For description of tables and charts, see REVIEW, July, 1922, pp. 384-385.

<sup>2</sup>Other dates also.